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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/560,516

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Jorg Muller

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EXAMINER

HURST, JONATHAN M

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/560,516	Applicant(s) MULLER ET AL.	
	Examiner JONATHAN M. HURST	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>05/19/2006 and 12/21/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 41 is rejected under 35 U.S.C. 112, 2nd paragraph because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claim 41 provides for the use of miniaturized device, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim Rejections - 35 USC § 103

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1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 22-26, 34-35, and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bakajin et al. (US 7,290,667) in view of Mayer et al. (US 6,763,710)

Regarding claim 22 Bakajin et al. discloses a miniaturized device for the storage and/or enrichment of molecules or atoms, or both, especially for a miniaturized gas chromatograph, (See Abstract and Col. 5 Line44-Col. 6 Line 10) characterized by a chamber with a filling material, the filling material comprising carbon nanotubes and/or carbon nanofibers, (See Abstract and Figure 1A-1D carbon nanofibers 14) and wherein the filling material is covered thus forming the chamber (See Col. 3 Lines 40-46 and Figure 1D cover 15) and wherein the chamber comprises an inlet and an outlet for the delivery and extraction of a sample of molecules or atoms, or both. (See Figure 3 where

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a channel with inlet and outlet is shown and further it is inherent that when fluid is meant to flow through a channel said channel must have an inlet and outlet)

Bakajin does not specifically disclose the miniaturized device wherein the filling material is covered by at least one layer of amorphous carbon.

Mayer et al. discloses the use of a layer of Diamond-Like Carbon, an amorphous carbon, to seal or cover an opening formed in a silicon substrate. (See Col. 2 Line 61-Col. 3 Line 6)

It would have been obvious to one of ordinary skill in the art at the time of invention to use an amorphous carbon sealing a channel as described by Mayer et al. to seal a channel in the device of Bakajin because the amorphous carbon Diamond-Like carbon, is known to be used to cover silicon channels with as required by Bakajin (See Col. 3 Lines 40-45 and Figure 1D where cover 15 closes a gap in a silicon substrate also see Mayer Fig. 3 where Diamond-Like carbon layer 15 covers a gap in a silicon substrate 5) and amorphous Diamond-Like carbon provides high hardness and stability especially suited for use as a cover layer. (See Mayer Col. 1 Lines 48-54)

Regarding claim 23 modified Bakajin discloses all the claim limitations as set forth above as well as the miniaturized device characterized in that the filling material is

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porous. (See Col. 2 Line 60- Col. 3 Line12 where nanotubes have pores)

Regarding claims 24-26 modified Bakajin discloses all the claim limitations as set forth above as well as the miniaturized device characterized in that the chamber is formed on a carrier characterized in that the chamber is located on the surface of a carrier or that it is embedded in the surface of the carrier and characterized in that the carrier is a silicon wafer. (See Figure 1A-1D and Col. 3 Lines 50-65 where chamber is formed in or on a silicon substrate)

Regarding claim 34 modified Bakajin discloses all the claim limitations as set forth above as well as the miniaturized device characterized in that the chamber is formed in a shape of a channel. (See Abstract and Figure 3 where chamber is a channel)

Regarding claim 35 modified Bakajin discloses all the claim limitations as set forth above as well as the miniaturized device characterized in that the outlet can be connected to the inlet of a separation column. (See Bakajin Col. 5 Line 44- Col. 6 Line 10 where the device is used in and or as a separation column system and thus is fully capable of being connected to a separation column)

Furthermore regarding limitations recited in claim 35 which are directed to a manner of operating disclosed device, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim.

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Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states “Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.”

Regarding claim 41 Bakajin et al. discloses a method for the storage and/or enrichment of molecules or atoms, or both, for the purpose of analysis of the molecules or atoms (See Abstract and Col. 5 Line44-Col. 6 Line 10)

wherein said method utilizes a miniaturized device characterized by a chamber with a filling material, the filling material comprising carbon nanotubes and/or carbon nanofibers (See Abstract and Figure 1A-1D carbon nanofibers 14)

and wherein the filling material is covered thus forming the chamber, (See Col. 3 Lines 40-46 and Figure 1D cover 15)

and wherein the chamber comprises an inlet and an outlet for the delivery and extraction of a sample of molecules or atoms, or both. (See Figure 3 where a channel with inlet and outlet is shown and further it is inherent that when fluid is meant to flow

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through a channel said channel must have an inlet and outlet)

Bakajin does not specifically disclose the method wherein the miniaturized device comprises a filling material is covered by at least one layer of amorphous carbon.

Mayer et al. discloses the use of a layer of Diamond-Like Carbon, an amorphous carbon, to seal or cover an opening formed in a silicon substrate. (See Col. 2 Line 61-Col. 3 Line 6)

It would have been obvious to one of ordinary skill in the art at the time of invention to use an amorphous carbon sealing a channel as described by Mayer et al. to seal a channel in a miniaturized device in the method of Bakajin because the amorphous carbon Diamond-Like carbon, is known to be used to cover silicon channels with as required by Bakajin (See Col. 3 Lines 40-45 and Figure 1D where cover 15 closes a gap in a silicon substrate also see Mayer Fig. 3 where Diamond-Like carbon layer 15 covers a gap in a silicon substrate 5) and amorphous Diamond-Like carbon provides high hardness and stability especially suited for use as a cover layer. (See Mayer Col. 1 Lines 48-54)

Regarding claims 42-43 modified Bakajin discloses all the claim limitations as set forth above as well as the method characterized in that molecules or atoms are stored and/or enriched from a fluid stream where said fluid stream is a gas stream (See Col. 5

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Lines 24-29 where filtering, separating, and or concentrating are forms of enrichment and can be performed on a gas fluid stream)

4. Claims 27-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over unpatentable over Bakajin et al. (US 7,290,667) in view of Mayer et al. (US 6,763,710) as applied to claims 22-26, 34-35, and 41-43 above, and further in view of Gordon (US 5,954,860).

Regarding claims 27 and 30, modified Bakajin discloses all the claim limitations as set forth above but does not disclose the miniaturized device characterized in that a heating unit is provided or the miniaturized device characterized in that a cooling unit is provided.

Gordon discloses a miniaturized device for use in a gas chromatography system comprising a tubular column packed with a material that absorbs analytes (See Col. 1 Lines 17-30) characterized in that a heating unit is provided and characterized in that a cooling unit is provided. (See Col. 1 Line 64- Col. 3 Line 34 and Figure 1 Heater 106 and Cooler 108)

It would have been obvious to one of ordinary skill in the art to use a heater and or cooler as described by Gordon in the device of modified Bakajin because heaters

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and coolers are known in the art to be used in gas chromatography systems comprising filled columns for separating or containing analytes as described by modified Bakajin and Gordon (See Bakajin Abstract, Col. 5 Line 25-29, and Col. 3 Lines 46-61 and also see Gordon Col. 1 Lines 18-32) and coolers and heaters provide increased sensitivity and reduce the need for longer columns in such systems. (See Gordon Col. 1 Line 33- Col. 2 Line 10). The coolers and heaters further provide an effective way of changing environmental conditions to release analyte species captured in a channel as taught by modified Bakajin. (See Bakajin Col. 5 Lines 46-59 and Gordon Col. 1 Line 65- Col. 2 Line 10)

Regarding claim 28, modified Bakajin discloses all the claim limitations as set forth above but does not specifically disclose the miniaturized device characterized in that the heating unit is located opposite to the side of the surface of the carrier with the chamber.

While modified Bakajin does not specifically disclose the heating element being located on the opposite side of the surface of the carrier of the chamber it would have been obvious to one having ordinary skill in the art at the time the invention was made place said heating element on the opposite side of the surface of the carrier of the chamber, since it has been held that rearranging parts of an invention involves only routine skill in the art while the device having the claimed dimensions would not perform differently than the prior art device, *In re Japikse*, 86 USPQ 70 and since it has been held that a mere reversal of the essential working parts of a device involves only routine

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skill in the art, In re Einstein, 8 USPQ 167.

Regarding claim 29, modified Bakajin discloses all the claim limitations as set forth above as well as the miniaturized device characterized in that the heating unit comprises a resistive heating element (See Abstract) While modified Bakajin does not specifically disclose the resistive heating element being produced via thick-film or thin-film technology it would have been obvious to one of ordinary skill in the art at the time of invention to use a resistive heating element produced via thick-film or thin-film technology because thick and thin film resistive heating elements represent one of a limited number of types of resistive heating elements and a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.

Furthermore since the instant specification is silent to unexpected result, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a thick or thin film resistive heating element because selecting one of known designs for a resistive heating element would have been considered obvious to one of ordinary skill in the art at the time of the invention and because said thick or thin film resistive heating element would operate equally well as the one disclosed by modified Bakajin

Furthermore regarding the recitation of a method of making said heating element, the examiner notes that the determination of patentability is determined by the recited

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structure of the apparatus and not by a method of making said structure. A claim containing a recitation with respect to the manner in which a claimed apparatus is made does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim.

Regarding claim 31, modified Bakajin discloses all the claim limitations as set forth above as well as the miniaturized device characterized in that the cooling unit comprises a Peltier-element. (See Abstract)

Regarding claims 32 and 33, modified Bakajin discloses all the claim limitations as set forth above but does not specifically disclose the miniaturized device characterized in that the cooling unit is located opposite to the side of the surface of the carrier with the chamber and characterized in that the cooling unit is located in a recess of the carrier.

While modified Bakajin does not specifically disclose the cooling unit being located opposite to the side of the surface of the carrier with the chamber it would have been obvious to one having ordinary skill in the art at the time the invention was made place said cooling unit opposite to the side of the surface of the carrier with the chamber, since it has been held that rearranging parts of an invention involves only routine skill in the art while the device having the claimed dimensions would not perform differently than the prior art device, *In re Japikse*, 86 USPQ 70 and since it has been

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held that a mere reversal of the essential working parts of a device involves only routine skill in the art, *In re Einstein*, 8 USPQ 167.

Furthermore as instant specification is silent to unexpected results, it would have been obvious to one of ordinary skill in the art at the time the invention was made to place the cooling unit in a recess of the carrier since such modification would have involved making elements integral. Making elements integral is generally recognized as being within the level of ordinary skill in the art. *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965).

5. Claims 36-40, rejected under 35 U.S.C. 103(a) as being unpatentable over Bakajin et al. (US 7,290,667) in view of Bailey et al. (US 5,569,501)

Regarding claim 36 Bakajin et al. discloses a process for the production of a miniaturized device for the storage and/or enrichment of molecules or atoms, or both, especially for a miniaturized gas chromatograph, characterized by the following steps:
(See Abstract)

a) Deposition of at least one layer of filling material, which comprises nanoscale carbon nanotubes, carbon nanofibers and/or fullerenes on to a carrier and (See Abstract and

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b) Covering of said at least one layer of filling material with at least one whereby the layer of filling material and the layer are deposited in such a way onto the carrier that a channel is formed between the carrier and the layer, the channel containing the filling material, and whereby two openings are structured into the carrier which can be used to connect the channel to the outside world. (See Figure 1A-1D where cover layer 15 is deposited on the substrate to form a channel and Figure 3 where channel has openings to connect the channel to the outside world)

Bakajin does not the at least one layer being amorphous carbon.

Bailey et al. discloses the use of a layer of amorphous carbon, Diamond-Like carbon, which is deposited onto a substrate and used as a coating, i.e. cover, t. (See Abstract and Col. 1 Lines 23-30)

It would have been obvious to one of ordinary skill in the art at the time of invention to deposit a layer of amorphous Diamond-Like carbon onto a device as described by Bailey et al. in the process for the production of a miniaturized device as described by Bakajin et al. because Diamond-Like Carbon is known in the art to provide a cover layer or coating as required by Bakajin (See Bailey Abstract and Col. 1 Lines 23-30 and also see Bakajin Col. 3 Lines 40-45) and Diamond-Like carbon is a known stable, hard, and scratch resistant material useful in coating, ie covering, and a wide variety of other applications. (See Bailey Abstract and Col. 1 Lines 8-30)

Regarding claim 37 modified Bakajin discloses all the claim limitations as set forth above as well as the process characterized in that the layer of filling material is deposited via Chemical Vapor Deposition (CVD) and the layer of amorphous carbon is deposited via Plasma Enhanced Chemical Vapor Deposition (PECVD). (See Bailey Abstract where amorphous carbon is deposited via PECVD and also see Bakajin Col. 3 Lines 46-50 where nanotubes are deposited using a CVD growth process)

While modified Bakajin may not specifically disclose the use of a Plasma Enhanced Chemical Vapor Deposition (PECVD) method for depositing the filling material it would have been obvious to one of ordinary skill in the art at the time of invention to use PECVD to deposit the filling material because PECVD represents one of a limited number of forms of CVD and a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, depositing a filling material, it is likely the product not of innovation but of ordinary skill and common sense.

Regarding claims 38-39 modified Bakajin discloses all the claim limitations as set forth above as well as the process characterized in that the area of the carrier, where the layer of filling material is deposited, is predefined by a catalyst layer of structured transition metal, previously deposited on the carrier characterized in that iron is used as the transition metal. (See Col. 3 Lines 50-65 and Figure 1A 12)

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Regarding claim 40 modified Bakajin discloses all the claim limitations as set forth above as well as the process characterized in that a silicon wafer is used as a carrier. (See Col. 3 Lines 50-65 and Figure 1A 11)

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN M. HURST whose telephone number is (571)270-7065. The examiner can normally be reached on Mon. - Thurs. 6:30-5:00; Every Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. M. H./
Examiner, Art Unit 1797

/Jill Warden/
Supervisory Patent Examiner, Art Unit 1797

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